LAUGHS AND INSIGHTS: SELF-KNOWLEDGE AND THE EFFECTS OF PORTABLE COUNTING INSTRUMENTS ON FREQUENCY OF SELF-MONITORED PUBLIC AND PRIVATE BEHAVIORS

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1971

Submitted to the Faculty of the Graduate College
of the Oklahoma State University
in partial fulfillment of the requirements
for the Degree of
MASTER OF SCIENCE
May, 1975

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ACKNOWLEDGEMENTS

Special thanks to Dr. Robert J. Weber, my committee chairman who was instrumental in the original conception of this study and who was infinitely patient with me throughout all aspects of the thesis project. Also thanks to the support and patience given me by my other committee members, Dr. Larry T. Brown and Dr. Phillip J. Murphy. Thanks specially to Dr. Barbara J. Weiner for aiding in the statistical treatment of the data.

My parents deserve a special thanks for their sacrifices, support, and faith in me.

Also thanks to Dr. Warren H. Jones and Kathy Jones for their aid and encouragement at crucial times.

Finally, a most special thanks to my wife Carol for enduring and for her constant caring.

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CHAPTER I

INTRODUCTION AND LITERATURE REVIEW

Until recently investigations of self-awareness and self-knowledge have been hindered by conceptual confusion and the contention of many psychologists and psychotherapists that self-knowledge or self-awareness cannot be studied empirically (Rogers, 1959). Behavioral psychologists were reluctant to talk about self-knowledge or self-awareness for fear that such metalistic concepts represented an atavistic return to introspectionism. To the extent that behavioral psychologists have traditionally excluded such topics from their analysis, the individual's knowledge or awareness of his own behavior has received little scientific attention.

Homme (1965) in a classic paper attributed the reluctance of behavioral psychologists to study private internal events to the labels affixed to those events. Private events are frequently labeled as "states" of the organism and as a consequence no body of behavior technology exists for controlling the frequency or extent of states. Homme suggests treating states as coverants or covert operants so that operant conditioning techniques can be brought to bear. Publication of this paper has led to the acknowledgement of the importance of private events in the development of a comprehensive technology of behavior, and more importantly to the systematic study of private events and their effects on overt behavior.

As Jacobs and Sachs (1970) point out, although the nature of many classes of covert responses will always render them private, manipulation of their frequency of probability has observable consequences for overt behavior, and a potential source of validation is thereby provided. More recently Bandura (1974) has pointed to the growing body of empirical evidence which supports the common notion that overt behavior is significantly influenced by cognition, and that cognition, when activated instructionally, plays a larger part in what and how people learn than does the repetitive reinforcement of overt responses. Barber (1969) has demonstrated that instructions to think, imagine, or visualize in specific ways can produce dramatic physiological and behavioral effects. Covert desentization has been demonstrated as an effective method employing imagery to modify a wide range of overt approach behaviors (Wolpe, 1958; Misler and Wolpe, 1967; Kahn and Baker, 1968; Marquis and Morgan, 1968; Donner, 1970; Suinn, 1970). Covert sensitization procedures using imagined aversive stimuli and imagined escape from the aversive stimuli have been found to be moderately successful in the treatment of homosexual, smoking, eating, and alcohol consumption behaviors (Mullen, 1965; Cautela, 1969). Other investigators have failed to demonstrate the effectiveness of this procedure in the treatment of alcoholics when used as the sole treatment strategy (Ashem and Donner, 1968). However, Wagner and Bragg (1970) have combined covert desensitization and covert sensitization in the successful reduction of smoking behavior. It should be noted that both desensitization and sensitization procedures are applications of a covert respondent conditioning paradigm and as such emphasize the pairing of stimuli to effect changes in the overt response. Mahoney and Thoresen (1974) point out, as did Homme (1965) and Jacobs and Sachs (1970), that covert events can also be used as targets of behavior change as well as consequences of behavior. Mahoney, Thoresen, and Danaher (1972) used external reinforcement and punishment to modify covert memorization strategies of subjects in a paired associates memory task. Covert events like depressive thoughts, deviant sexual fantasies, and obsessions have also been successfully modified (Mees, 1966; Johnson, 1971; Mahoney, 1971; Jackson, 1972). Meichenbaum and Cameron (1974) trained speech anxious subjects to observe and to monitor their internal monologues during stress situations and then to substitute more adaptive monologues in response to the anxiety provoking situations. Those authors also report success using this method in modifying a wide range of what clients say to themselves.

The utilization of covert events as consequences, i.e., self-praise and self-punishment, has also been widely reported and demonstrated to be an effective strategy in the modification of a number of problematic behaviors (Dulany, 1968; Bandura, 1969; Staats, 1972; Mahoney and Thoresen, 1974).

In most traditional behavior modification programs the therapist or experimenter is responsible for the systematic observation of the client's behavior and the subsequent manipulations of the behavior. This strategy is adequate as long as the behavior of interest is external and a frequency count can easily be obtained. In similar studies or treatments involving covert behavior, changes are inferred from changes in external behavior referents, which are assumed to be related to the internal event; this is the familiar intervening variable approach that has proven to be a valuable concept in the tracking of private events (Jeffreys, 1974).

Recent applications of self-control or self-behavior modification procedures have relied heavily on self-observation data to track changes in behavior as a result of stimulus rearrangement and/or response consequation (Thoresen and Mahoney, 1974; Mahoney and Thoresen, 1974). Self-observation as such requires the individual to attend to his own behavior and to keep a systematic record of its occurrence. For the individual to recognize that he is behaving either covertly as in thinking or overtly as in talking, initially there is a problem of detection or discrimination of on-going self-events. This is a problem very similar to that encountered in perceptual experimentation in which the subject is required to demonstrate his awareness of variations in externally presented stimuli as in detection and discrimination tasks (Haber, 1968). Tasks involved in the experimental investigation of memory and attention processes are also closely related to the problem faced by the self-observer. In these tasks, subjects must report, either in recognition or recall form, on stimulus events retained internally (Bower, 1974). Ferster (1972) considers the detection response or discriminative response the awareness facet of self-observation. Thoresen and Mahoney (1974) further state that the discrimination response is best viewed as a response in itself, functionally similar to other instrumental responses and under the control of internal and external stimuli. Skinner adds, "the crucial thing is not whether the behavior which a man fails to report is actually observable by him, but whether he has ever been given any reason to observe it" (1953, p. 289).

One method of eliciting self-observation responses is simply to ask the subject to attend to his own external or internal responses; e.g., a response definition is given and the subject is to detect the occurrence of the response. This is precisely the procedure used in self-modification programs involving a wide range of internal and external responses (Thoresen and Mahoney, 1974; Mahoney and Thoresen, 1974).

Given that the individual can observe himself, it has recently been proposed by Mahoney and Thoresen (1974) that the extent of self-knowledge might be accessed by having individuals estimate and to then count self-produced behaviors. Using this procedure, Weber, Wegmann, Ruder, and Younger (1974) found support for partial self-knowledge of two classes of behavior, external (bites) and internal (insights).

Partial self-knowledge of one's behavior, in this instance frequency knowledge, can be seen as varying between two ends of a self-knowledge continuum, with no self-knowledge at one end and complete self-knowledge at the other end. Considering self-knowledge in this manner is of considerable theoretical importance in that various important variables can be seen as influencing the degree of self-knowledge as it shifts from one end to the other of the continuum. One important variable would be the class of behavior being assessed, i.e., public objective vs. private subjective.

Although behavioral psychologists might have predicted more self-knowledge of the external behavior (bites) because of its definite response topography, correlations between estimates and counts in the Weber, et al. (1974) study, the correlations were .30 and .60 for bites and insights, respectively. These correlations seem reasonable in light of the fact that individuals are not generally in the habit of making such systematic self-observations. In fact, precise feedback or knowledge of one's own behavior is often very different than what the individual suspects (Mahoney and Thoresen, 1974). It is possible, however, that the extent of agreement between subjects' estimates and counts could be accounted for by a systematic self-demand characteristic. Namely, subjects could have retained their estimates and subsequently fabricated a count of the behavior in order to impress the experimenter with their self-knowledge. It thus becomes necessary to control for such an influence in further investigations of behavioral self-knowledge in order to ascertain the validity of such a procedure.

Thus, one purpose of the present study was to examine the procedure for assessing behavioral self-knowledge proposed by Mahoney and Thoresen (1972) and to partially replicate the Weber, et al. (1974) study with the previously mentioned demand characteristic systematically controlled

Another important facet of self-knowledge explored in this study involves the systematic recording or monitoring of self-produced responses by the same person in which the response is occurring. A benefit of such data collection is that it can serve as a method for evaluating treatment effects and it allows some quantification of private events that are inaccessible to the observer, e.g., researchers and psychotherapists. Self-monitored data has been used most extensively in research, primarily to assess effects of reinforcement, punishment, and extinction of problematic behaviors, and as a consequence, some type of self-monitored data has been used in various self-change programs, e.g., Homme, 1965; Kanfer, 1970; McFall, 1970; McFall and Hammen, 1971; Mahoney, Moore, Wade, and Moura, 1973; Axelrod, Hall, Weis, Rohrer, 1974; Bolstad and Johnson, 1972; Borden, Hall and Mitts, 1971. It was the use of self-monitored data in such self-modification projects as these that led behavioral researchers to recognize the singular importance of self-observation as a performance in its own right (Kanfer, 1970; McFall, 1970; Mahoney and Thoresen, 1974). Kanfer (1970) has pointed to similarity of methodological problems found in perceptual reports and other areas of research that require the use of the subject's verbal report and to those problems to be found in self-monitoring experiments.

Webb, Campbell, Schwartz, and Sechrest (1966) have drawn attention to the experimental problem of reactivity, which is the tendency for certain measurement operations to function as an unintended, independent source of influence on the behavior being measured. Reactivity in self-monitored smoking rates has been reported by McFall (1970).

Non-smoking members of a college class were instructed to unobtrusively observe and record the rate of cigarettes smoked by smoking members of the class. Non-smokers recorded the number of cigarettes smoked for three treatment periods: base, monitor, and rebase. During the monitor phase, half of the smoking students counted the number of cigarettes they smoked and the other half were asked to count urges to smoke only when smoking did not follow the urge. Ss who counted the number of cigarettes smoked increased their rate of smoking during the monitor phase while Ss who were counting urges to smoke only when smoking did not follow the urge decreased the rate of smoking. McFall (1970) viewed the counting of cigarettes smoked as focusing on the positive instances of smoking and the counting of urges followed only by not smoking as focusing on the negative instances of smoking. Such results as these have led investigators to distinguish between positive reactivity which is associated with elevated rates of behavior and negative reactivity which is associated with depressed rates of behavior (Kanfer, 1970, McFall, 1970).

McNamara (1970) reports increased nail-length over a period of time for three groups of nail-biters; one group self-monitored nail-biting, another group self-monitored related hand to face behaviors, and another group of subjects who did not self-monitor but were given information concerning the merits of not biting their nails. McNamara suggests that demand characteristics and expectancy effects may account for much of the effects attributed to reactivity of self-monitored data. One method of controlling for the effects of reactivity in self-monitored data has been recently suggested by Gottman and Lieblum (1974), who recommend an extended self-observation period such that the data can stabilize and variability becomes small around the mean. These authors note that allowing the data to stabilize is particularly important for baseline data that will be used later to assess intervention effects (1974). Jeffreys has also suggested practice with a wide range of behaviors, perhaps starting with motor behaviors which have clear response topographies (1974).

Reliability assessments can easily be made of self-monitored external public behaviors by the use of independent unobtrusive observer's counts of the same behavior. Bernstein (1969) reports consistent and high interjudge reliability coefficients in smoking behavior. The analysis of behavior products like weight gain or loss or discarded cigarette butts can serve as reliability checks on self-monitored behaviors (Kanfer, 1970). Arcival data such as that accumulated as a part of an institution's normal record keeping, i.e., grades, attendance, and disciplinary records, can be used to assess the consequences of self-monitored study behavior (Gottman and Lieblum, 1974). Reliability assessments of self-monitored internal events are more difficult to make and chances for error are greater than that for external behaviors, however, some attempts have been made to estimate the reliability of these data by correlating the client's report with another observable event (McFall, 1970).

Other factors which might affect the reliability and validity of self-monitored data are: choice of experimental instructions, the implicit desirability or undesirability of the response class, choice of when the observation is to be made, such as prior, during or following the crucial response (Kanfer, 1970). Mahoney and Thoresen have pointed to the differential effects of continuous real-time counting and time sampling techniques on the information content and type of data reported by self-observing subjects (1974). Another problem that occurs is that of definitional drift, which is the tendency of both external and self-observers to redefine the target behavior, especially if the observation period extends for a protracted time. This tendency may be controlled by intermittant and periodic restatement of the behavioral definition (Jeffreys, 1974).

Thoresen and Mahoney (1974) point out that the present technology of self-observation remains primitive and that little is known about the specific effects of certain kinds of self-monitoring devices on self-monitored data. Some common devices that have been used in self-monitoring studies are: wrist counters, pocket counters, wrist pads, booklets, and 3" X 5" cards. Among the most widely used have been the wrist counter (Lindsley, 1968; Katz, 1973), the pocket counter (Weber, et al., 1974; Whaley, 1974), and the 3" X 5" card (Weber, et al., 1974).

In response to the need for such an investigation, the final aspect of the present study involved the assessment of differential effects of counting devices on subjects' frequency counts of two classes of behavior.

Statement of Purpose

The purpose of the present study was: (1) to assess the degree of self-knowledge of public objective behavior (laughs) relative to a private subjective behavior (insights), (2) to test the relative effects on frequency counts of three types of portable counting devices: wrist counter, pocket counter and 3" X 5" file card, and (3) to determine if a preliminary estimate of the frequency of a behavior acts as a demand characteristic in subsequent real-time counts of that behavior.

The private subjective behavior (insights) or the 'aha' experience (Buhler, 1928), was chosen not only because it is representative of a different class of responses than are (laughs) a public objective behavior, but also because of the suspected real frequency differences between the two behaviors. Normative information for insight behavior was reported by Weber, et al. (1974) to have a mean occurrence of 5.38 for a twenty-four hour period. Normative information on laughs was obtained in a pilot investigation by the present author, and was found to have a mean frequency of 56.0 for a twenty-four hour period. A recent study by Weber, Wegmann, Younger, and Mallue (1975), reports a mean count of 35.2 laughs for a one day period. Both insights and laughs were real-time, or continuous counts made in the Ss' natural environment and were obtained with pocket counters calibrated 0-99. Weber (1974) has pointed to the feasibility of such an approach in developing a cognitive-behavioral ethology of many important responses which occur in the individual's natural environment. Thus establishing a reliable methodology for assessing behavioral self-knowledge and a systematic investigation of self-monitoring instruments is the major focus of this study.

Thoresen and Mahoney (1974) also suggest that the type of counter might interact with different types of behavior under observation. Therefore, it was decided that two very different classes of behavior laughs (public) and insights (private), one having a low frequency of occurrence and one having a higher frequency of occurrence, might optimize the chance of picking up a counting instrument by behavior interaction.

Finally, it has been suggested that sex of Ss is often a variable unaccounted for in self-monitoring studies and as a result makes some studies difficult to interpret (Thoresen and Mahoney, 1974; Jeffreys, 1974). For example, because dresses are not likely to have pockets the use of pocket counters by female Ss might produce different results than for male Ss. In addition, there might be other substantive variables that would produce self-monitoring differences between male and female Ss. Sex of Ss is therefore included in this study to look at any systematic effects it may have on the frequencies of the two classes of behaviors under investigation.

Statement of Hypothesis

The main questions being investigated were: (1) what is the extent of self-knowledge for a public objective behavior (laughs) and for a private subjective behavior (insights; 'aha' experience)? In particular, is self-knowledge of one behavior superior to the other. The basic task was for Ss in an estimate group (EG) to estimate numerically the frequencies of both behaviors and then to count them in real-time for a twenty-four hour period. Ss in a no estimate group (NEG) were simply to make the counts without first estimating their frequencies. (2) Does type of counting device (wrist, pocket, 3" X 5" card), estimating or not estimating before counting, or sex of Ss have an effect on real-time frequencies?

Specific hypotheses are posited for each of the major questions:

(1) It is expected that correlations obtained between estimates and counts of insights and laughs will be well above chance levels. Thus supporting a partial self-knowledge hypothesis.

(2) For the estimate group (EG) Ss it is expected that estimates and counts for both behaviors will not differ significantly, thus providing support for the partial self-knowledge hypothesis. It is also expected that the frequencies for estimated laughs and insights, and counted laughs and insights will differ, thus supporting self-knowledge of the assumed frequency differences of the two behaviors.

(3) It is expected that consistent differences will be found between the frequencies of laughs and insights for counts of all ninety-six Ss.

(4) It is expected that mechanical counters, wrist and pocket, will net higher frequencies of laughs compared with insights. It is also felt that count frequencies may differ for both behaviors as wrist counters may more readily serve the function of discriminative cues for attending to the counting task.

(5) It is expected that Ss will rate the mechanical counters as more convenient than the 3" X 5" cards.

(6) As sex of S has not been previously investigated in studies of this kind, no differential predictions are made.

(7) It was felt that Ss who were asked to estimate the frequency of their behaviors may create a self-demand expectancy to make their counts agree closely with their estimates and as a result would differentiate themselves from Ss who were not asked to estimate prior to counting.

This difference was expected to show itself in the comparison of the counts for the two groups (EG) vs. (NEG).

CHAPTER II

METHOD

Subjects

Forty-eight female and forty-eight male college students with a mean age of 19.5 years were recruited from psychology undergraduate classes to serve as subjects. Each received extra credit toward their course grade for volunteer participation. The Ss participated in one of sixteen experimental sessions covering a period of four working weeks: (Monday through Friday). Sixteen groups of Ss were generated, ranging from twelve to three Ss per group. The Ss were then randomly assigned to the three counting device conditions with thirty-two subjects per condition, sixteen males and sixteen females each. Finally, the S groups were assigned randomly to one of two treatments: an estimate group (EG) and a no-estimate group (NEG), resulting in twenty-four males and twenty-four females per treatment group.

Apparatus

The three types of counting devices employed were: (1) 3" X 5" ruled file cards; (2) double event pocket counters; and (3) single event wrist counters. The 3" X 5" cards were ruled and separated into two columns with typed column headings for laughs and insights. Thirty-two cards were used with column headings counterbalanced for laughs and insights. The cards afforded ample space for the recording of both behaviors under the column headings. The double event mechanical pocket counters used were modified two channel golf counters with each channel calibrated from 0 to 99. Each channel was labeled clearly with the behavior to be counted, i.e., laughs or insights. As with the cards, channel labels were counterbalanced for the two behaviors. Eight modified wrist golf counters with single event channels, calibrated from 0 to 99 were labeled and placed on four wrist bands resulting in two counters per wrist. One counter was labeled for insights and the other for laughs. The counters were then counterbalanced for position on the wrist. Before and during the experiment all counters were inspected for mechanical functioning and accuracy.

Written definitions of both behaviors were supplied to each S (see Appendix C). A two-page post-experimental questionnaire was also prepared for purposes of obtaining convenience ratings, information on the estimated percentage of fabricated count data, and S's reactions to the counting procedure (Appendix A).

Procedure

The Ss were seen in groups ranging from twelve to three Ss per group by the same E in a small, comfortable conference room. The present author served as E. All Ss were met individually at the entrance of the conference room and given a counter (randomly assigned) and a sheet of paper with the definitions of both laughs and insights. After all Ss were seated, they were reminded that in order for the course credit to be given they would have to return the following day at the end of the twenty-four hour period. Only two Ss failed to return for the second session. As a result, two extra experimental sessions were run to meet the cell size requirements of the factorial design.

During the first session, identical instructions were read to both the estimate group (EG) and the no-estimate group (NEG), with the exception that the EG _Ss_ were provided with prepared forms with which to make a numerical estimate of how many times they laughed per day and how many insight experiences they had. These EG _Ss_ were asked to make their estimates after the definitions of laughs and insights were read and two examples of each given. All _Ss_ were instructed in the use of the counters and were told that they need not interrupt their normal activities while counting their behaviors in the next twenty-four hours. _Ss_ were also urged to do the counting in real-time, as the behaviors occurred, and that in order to do so they would have to have their counters or 3" X 5" cards with them throughout the count period (See Appendix B for complete instructions.). All _Ss_ were asked to begin counting upon leaving the conference room and to continue until the following day when they would return with their counters and count totals. For EG each _S_'s estimates were collected as he left the room.

At the second session the following day, the counters were collected along with the _S_'s count. Eleven _Ss_ who had been assigned the 0 to 99 calibrated wrist and pocket counters reported that their laugh counts were actually the number on the counter plus 100, as they had counted more laughs than could be registered on the mechanical counters. All other _Ss_ reported their counts as accurate as shown on the counting device. The _Ss_ were then given a two-page questionnaire. The first page required _Ss_ to rate on a five-point scale from _very convenient_ (1) to _not very convenient_ (5) the convenience of the counting device they had used. _Ss_ were further asked to estimate how long they had been without the counter in immediate reach (excluding sleeping and bathing time). The Ss also were asked if their counts were lower or higher than they had suspected. Finally, the second page consisted of a "fudging sheet" on which the Ss were to check one of the scale categories provided for the amount of data they had fudged for both laugh and insight behaviors. The categories were: none, 1-10%, 11-30%, 31-50%, 51-99%, all. (See Appendix A for questionnaire and fudging sheet.) Before Ss filled out the questionnaire and fudging sheet they were told not to place their names on either sheet and to be as candid as possible. After the questionnaire was completed the extra course credit for participation was recorded and each S was thanked for their cooperation during the experiment.

Data Analysis

The basic statistical design of the study involved the factorial combination (fixed effects model) of three between Ss factors: counting device (wrist, pocket, card), estimate and no-estimate, and sex. There was also one within Ss factor: insight vs. laughs. The Ss' total counted laughs and total counted insights served as the principal dependent measures in all conditions. Two between Ss factors, counters and sex, for the dependent measure convenience rating were combined in a factorial analysis.

Pearson r coefficients were then computed and critical tests made for estimates and counts for laughs and insights for Ss in the estimate group (EG), (n=48). A two factor repeated measures AOV was also performed on all frequencies for laughs-insights vs. estimates-counts.

CHAPTER III

RESULTS

Data for forty-eight Ss (EG) only, balanced for sex, were used in the computations of estimate-count correlations for both laughs and insights. Table I contains the summary statistics for EG, NEG, and both groups pooled. As indicated in Table I the mean values for estimates and counts for EG are quite similar. Figure 1 represents the frequency distributions for laughs, with estimates depicted in the top panel and the actual counts in the bottom panel. As suggested by Figure 1, the estimates are somewhat more variable than the counts. The Pearson product-moment correlation between estimates and count totals for laughs (r = .57, p < .0005) indicates that Ss did not have complete self-knowledge of the frequency of this behavior, but that they did have well above chance level knowledge of laugh frequency.

With respect to insights, estimates and counts for the same forty-eight EG Ss indicate a similar degree of self-knowledge. Figure 2 represents the frequency distributions for both estimates and counts of insights. Again the distribution for estimates is more variable than the distribution for counts. Also the means for estimates and counts (see Table I) of insight frequency are quite similar. A Pearson product-moment correlation (r = .45, p < .005) between estimated frequency and counted frequency indicates that Ss have substantial, but partial self-knowledge of insights as well.

TABLE I

COMPARATIVE STATISTICS FOR LAUGHS AND INSIGHTS

Group		Estimate	Count	r (Estimate, Count)
EG (n=48)	Laughs			
	M	36.60	45.95	.57, $p < .0005$
	SD	43.15	38.99	
	Mdn	20.33	32.0	
	Insights			
	M	8.22	6.08	.45, $p < .005$
	SD	6.66	5.10	
	Mdn	6.00	4.80	
NEG (n=48)	Laughs			
	M		45.29	
	SD		38.78	
	Mdn		32.80	
	Insights			
	M		5.43	
	SD		4.12	
	Mdn		4.79	
Pooled Groups (n=96)	Laughs			
	M		45.62	
	SD		38.94	
	Mdn		33.50	
	Insights			
	M		5.76	
	SD		4.69	
	Mdn		4.70	

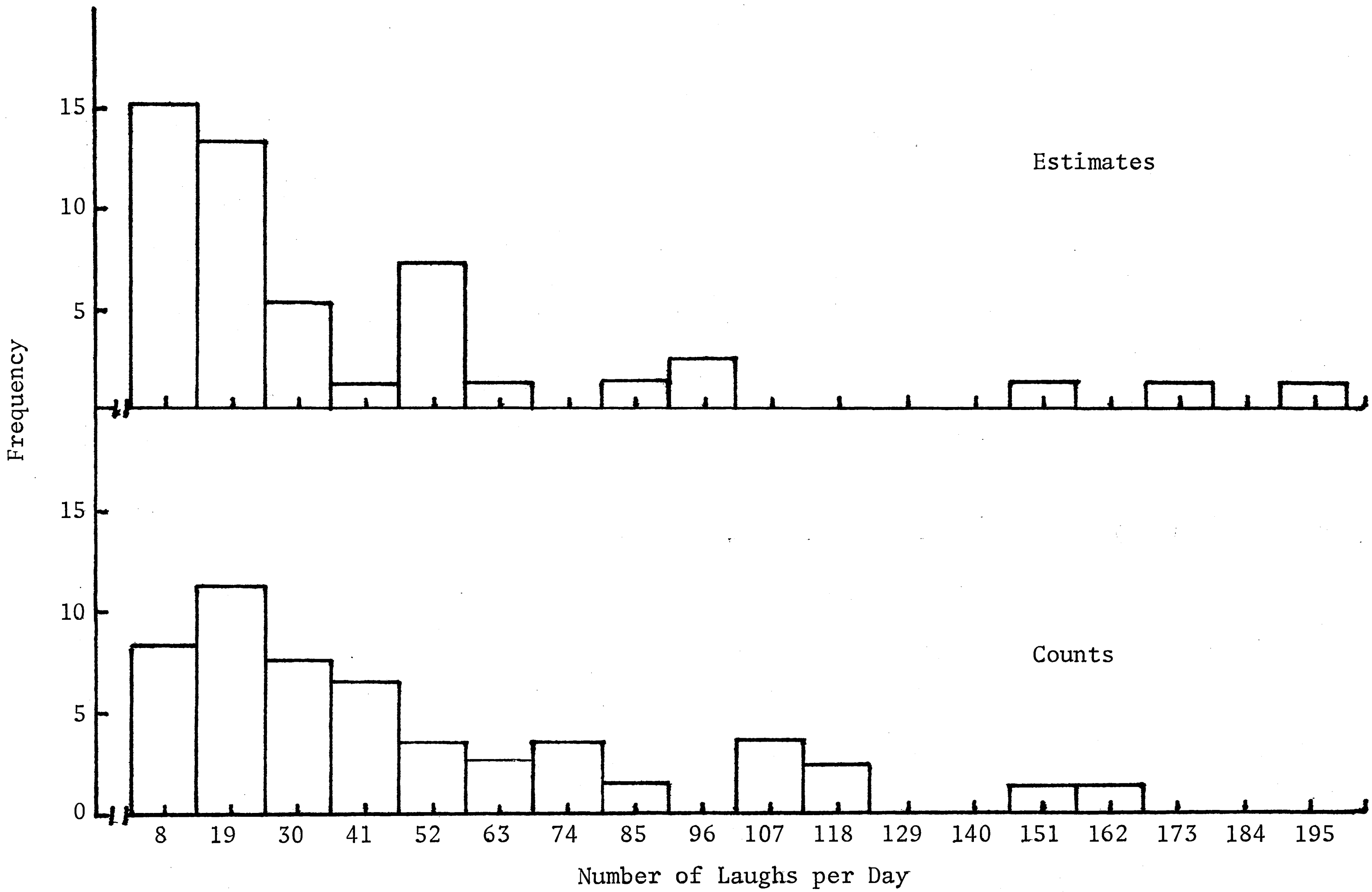

Figure 1. Estimated and Counted Frequencies of Laughs

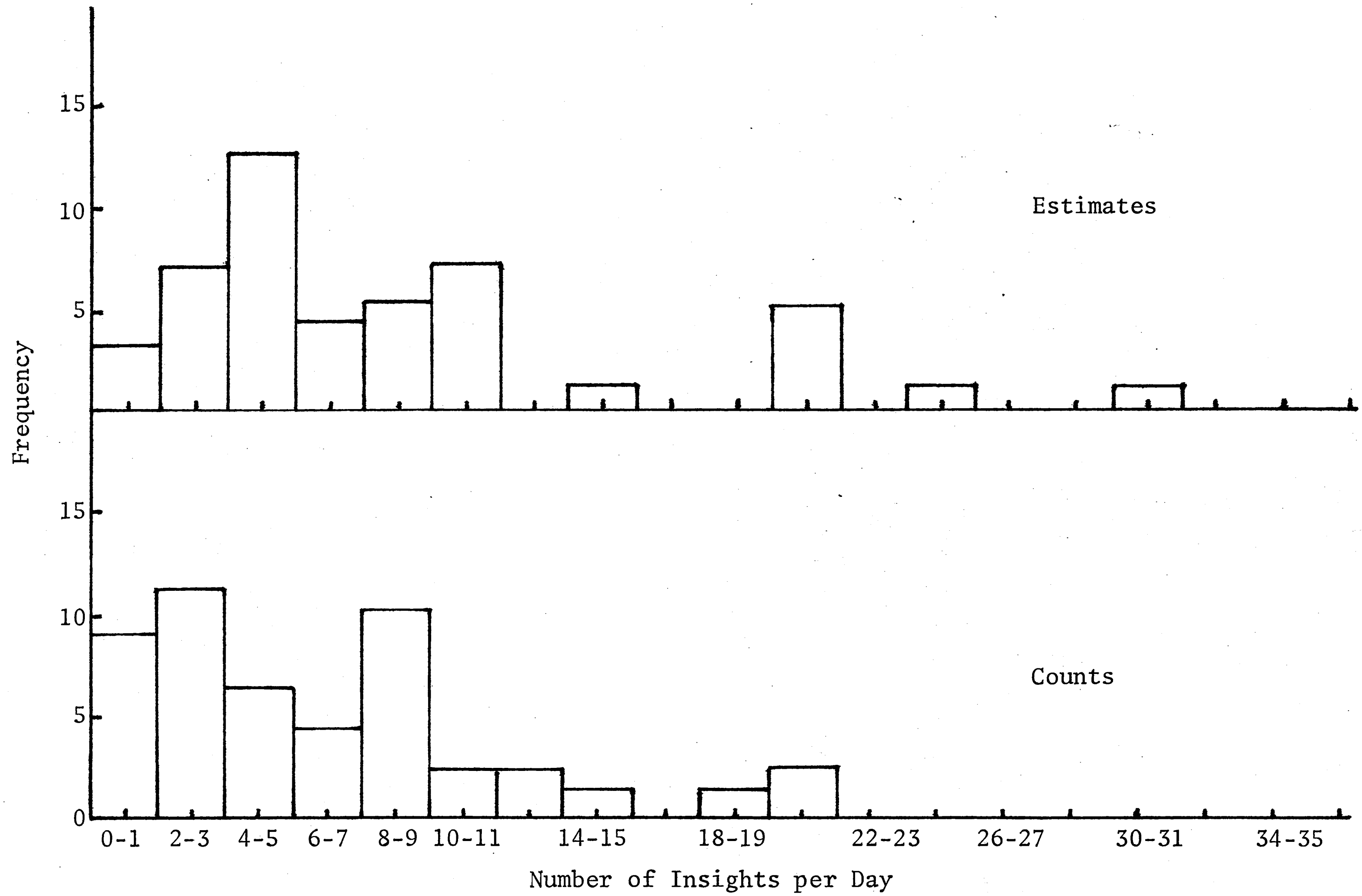

Figure 2. Estimated and Counted Frequencies of Insights

For the same EG data an analysis of variance (see Table II) comparing laughs-insights versus estimates-counts indicates a significant effect for laughs-insights, ($F = 29.63$, $p < .001$, for 1 and 47 df); no significant effect for estimates-counts, ($F < 1$, for 1 and 47 df); and a significant interaction for laughs-insights x estimates-counts, ($F = 117.04$, $p < .001$, for 1 and 47 df). The interaction indicates that Ss tended to under estimate the frequency of laughs and over estimate the frequency of insights.

For the pooled EG and NEG groups (see Table I), count total means for laughs and insights were 45.62 and 5.76, respectively. A single factor analysis of variance indicated that this difference was highly significant ($F = 103.58$, $p < .001$, for 1 and 95 df). Hypothesis (2) was thereby supported, indicating that consistent differences in frequency were observed between laughs and insights by Ss in all experimental conditions.

To determine whether the various levels of the three independent variables (counter used, EG/NEG, and sex) effected the counted frequency of both laughs and insights, additional tests of significance were performed. Table III represents mean laughs and insights as a function of the three independent variables. For laughs an analysis of variance yielded significant main effects for type of counter used and sex of S (see Table IV), but no significant effect for EG/NEG and no significant interactions. Subsequent analysis of pair-wise comparisons using Tukey's procedure (Kirk, 1968, p. 169), indicated that Ss using pocket counters reported significantly more laughs than did Ss using wrist counters ($q = 3.41$, $p < .05$, for 3 and 84 df) or 3" X 5" cards ($q = 4.96$, $p < .01$, for 3 and 84 df), while these latter two conditions did not differ

TABLE II

AOV OF FREQUENCIES: LAUGHS AND INSIGHTS VS. ESTIMATES AND COUNTS

Source	df	MS	F
Total	191		
Subjects	47		
Laughs/insights	1	45,545	26.630***
Estimate/counts	1	104	.272
Estimate/counts X Laughs/insights	1	11,939	117.040***
Error Laughs/insights	47	1,536.87	
Error Estimate/counts	47	380.65	
Error Est./Count X Laughs/insights	47	102.59	

Note: Significance levels for all tables are represented by the following: *** $p < .001$; ** $p < .01$; * $p < .05$.

TABLE III

MEAN COUNTS FOR LAUGHS AND INSIGHTS AS A FUNCTION OF COUNTING DEVICE, EG/NEG AND SEX

Behaviors	Counter			Group		Sex	
	Wrist	Pocket	Card	EG	NEG	Male	Female
Laughs	41.71	63.28	31.87	45.95	45.29	36.87	54.37
Insights	6.43	5.56	5.28	6.08	5.43	7.35	4.16

TABLE IV

AOV OF COUNTED LAUGHS: COUNTING DEVICE, SEX, AND EG/NEG

Source	df	MS	F
A (Counting device)	2	8257.027	6.3721*
B (Sex)	1	7350.000	5.6721*
C (EG/NEG)	1	10.666	0.0082
AB	2	719.152	0.5550
AC	2	49.258	0.0380
BC	1	433.497	0.3345
ABC	2	3698.834	2.8544
S(ABC)	84	1295.817	

significantly ($q = 1.55$, $p < .05$ for 3 and 84 df). Thus modest support was provided for the hypothesis that mechanical counters would yield higher counted frequencies of laughs. However, the significant difference between the wrist counter and pocket counter conditions and the failure of the wrist counter condition to significantly differ from the 3" X 5" card condition was unexpected.

The fact that females reported significantly more laughs than did males suggests that, as previously indicated, the sex variable is important for at least some self-monitoring tasks and therefore should be systematically controlled in future studies.

A similar analysis (counter used X EG/NEG X sex) was performed for the insight count frequency data. As indicated in Table V, no significant differences were found except for sex of S with males reporting significantly higher frequencies of insights.

Hypothesis (7) was not supported. No significant differences were found for EG as compared to NEG Ss for either laughs or insights, indicating that the function of estimating did not have a self-demand characteristic effect on these self-monitored behaviors.

The results of the obtained convenience ratings are summarized in Table VI. A two factor (counter X sex) analysis of variance was performed on the convenience ratings of the three types of counters, obtained from the post experiment questionnaire (Appendix A). As indicated in Table VII, only a counter effect was found ($F = 15.94$, $p < .01$, for 2 and 90 df). Post hoc comparisons were computed for all pair-wise mean combinations using Tukey's procedure (Kirk, 1968, p. 169). Wrist counters were rated significantly more convenient than pocket counters ($q = 3.44$, $p < .05$ for 3 and 90 df), and 3" X 5" cards ($q = 8.22$, $p < .01$, for 3 and

TABLE V

AOV OF COUNTED INSIGHTS: COUNTING DEVICE, SEX, AND EG/NEG

Source	df	MS	F
A (Counting device)	2	23.270	0.6459
B (Sex)	1	243.843	13.5370**
C (EG/NEG)	1	10.010	0.5557
AB	2	74.437	2.0662
AC	2	41.635	2.3114
BC	1	6.510	0.3614
ABC	2	27.510	1.5272
S(ABC)	84	18.013	

TABLE VI

MEAN CONVENIENCE RATING[1] AS A FUNCTION OF COUNTER X SEX

Wrist		Pocket		Card	
Male	Female	Male	Female	Male	Female
1.56	1.87	2.37	2.31	2.75	3.56

[1]Note: 1 = most convenient, to 5 = least convenient.

TABLE VII

AOV OF CONVENIENCE RATINGS: TYPE OF COUNTER AND SEX

Source	df	MS	F
A (Type counter)	2	16.6249	15.9495**
B (Sex)	1	3.0104	2.8881
AB	2	1.5416	1.4790
S(AB)	90	1.0423	

90 df).

Although specific hypotheses were not generated, the self-reported tendencies of Ss to fabricate and to be surprised with their actual real-time frequency counts were also analyzed. The percentage of Ss fabricating count data and the amount of fabrication for laughs and insights is given in Table VIII. As it might be expected that the covenience of the counters could be inversely related to the amount of reported fabricating, the various amounts are presented by type of counter and behavior (Appendix D). As there was a slight trend for Ss to report more fabricated laugh counts in the 3" X 5" card condition, an analysis of variance (counter X laughs/insights) was performed for the reported amounts of fabrication. For purposes of analysis, the ranges of fudging were arbitrarily assigned the numbers 1 for none, 2 for 1-10%, 3 for 11-30%, and so on. Means for the amount of fabricated data as a function of counter and behavior are given in Table IX. The analysis of the fabrication data yielded no significant differences for the type of counter or behavior (see Appendix E), indicating that the slight trend for Ss to report more fabrication of laughs for less convenient counters is not a significant one.

Table X presents the percentages of Ss reporting being surprised or not surprised in response to their counts of both laughs and insights as assessed on the post-experiment questionnaire. A 2 X 2 chi-square analysis (with Yates correction) indicated that Ss were significantly more surprised by the frequency with which they laughed (a public objective behavior) than by the number of insightful experiences (a private subjective behavior) they detected ($X^2 = 16.49$, $p < .01$, for 1 df).

TABLE VIII

DATA FABRICATION: PERCENT OF SUBJECTS FUDGING THE AMOUNT INDICATED

Behavior (n=96)	Amount Fudged (Percent of Data)					
	None	1-10	11-30	31-50	51-99	All
Laughs	66.0	31.2	1.00	1.00	1.00	0.00
Insights	66.0	30.2	3.10	1.00	0.00	0.00

TABLE IX

MEAN AMOUNT OF FABRICATED DATA AS A FUNCTION OF BEHAVIOR AND COUNTER (CODED PERCENTAGES)

Behavior	Counter		
	Wrist	Pocket	Card
Laughs	1.34	1.40	1.47
Insights	1.40	1.47	1.34

TABLE X

PERCENT OF SUBJECTS REPORTING SURPRISED AND NOT SURPRISED FOR LAUGH AND INSIGHT COUNTS

	Surprised	Not Surprised
Laughs	73.4	26.6
Insights	43.1	56.9

CHAPTER IV

DISCUSSION

Consider first the procedure used in assessing self-knowledge, and second the assumptions that were made concerning the reactivity of self-monitored data.

The procedure of estimating the frequencies of well-defined behaviors and the subsequent comparison of these frequencies with real-time, or continuously monitored frequencies of the same behavior, does not require of the S an analysis of the behavior, but simply requires the S to estimate and then to count the occurrence of that behavior. Estimating only requires that the S use information about one characteristic, i.e., frequency, of a well defined behavior. Counting requires only that the S be aware of the occurrence of the behavior and then to record it in some manner. As Weber, et al. (1974) noted, this procedure does not require elaborate description or analysis of consciousness, a requirement common to traditional introspective techniques.

Reactivity, as mentioned earlier, is the tendency for certain measurement operations to function as unintended, independent sources of influence on the behavior being measured (Webb, Campbell, Schwartz, and Sechrest, 1966). Self-monitored data has also been shown to be influenced by reactivity (McFall, 1970). In the present study reactivity effects associated with any but the experimental conditions were assumed to be equally distributed among the treatments based on the random assignment of Ss to the counting conditions and the estimate-no estimate groups.

Support was found for the first hypothesis that there would be significant correlations between estimates and counts for both laughs and insights. Ss apparently have considerable self-knowledge, although not complete, of these two very different behaviors. Self-knowledge of the private subjective behavior (insights) is nearly as extensive as that for the public objective behavior (laughs). Furthermore, no significant differences were found between mean estimates and counts for laughs or mean estimates and counts for insights. This finding further supports the partial self-knowledge hypothesis for both behaviors. Both estimated and counted insight frequencies were found to differ significantly from estimated and counted laugh frequencies, suggesting the Ss had self-knowledge of assumed real frequency differences between the two types of behavior. It was also found that Ss significantly underestimated laughs and significantly overestimated insights. This finding in isolation would seem to indicate that Ss had less self-knowledge about the real frequencies of these behaviors than suggested by the correlations. It seems likely, in respect to the main effects, that this interaction represents not a lack of self-knowledge but rather an effect attributable perhaps to a differential desirability of one behavior (insights) as opposed to the other behavior (laughs). Kanfer (1970) has suggested that social desirability of the response class may contribute to reactive effects found in self-monitoring studies. It is possible that the college Ss might attach more value to insights than to laughs, thus influencing their estimates of the two behaviors.

It is possible that the high correlations obtained between estimates and counts and the similarity between the two distributions may have arisen because of a self-demand characteristic, related to the process of estimating (Weber, et al., 1974). As this possibility was considered, both Ss who estimated and counted and Ss who simply counted the behaviors were included in this study. The self-knowledge of the difference in frequencies of the two behaviors was found for both groups of Ss, and it was further found that the means for counted insights and laughs for both groups were not significantly different. In fact, the means were nearly identical.

The reliability of measurements of private subjective behaviors are not directly assessable as in the case of public objective behaviors, which can be assessed by the use of interobserver reliability coefficients. Rather, private subjective behaviors have traditionally been assessed by inferring some relationship between the private behavior and some overt public behavior, which can be measured directly. The data presented here and also in the Weber, et al. (1974) study suggest that a more direct assessment of the reliability of some types of private subjective behaviors is possible. Notable in this proposition is the similarity of distribution changes from estimates to counts for both laughs and insights, e.g., similarity in the form of the distributions and the reduction in variability from estimate distributions to count distributions.

The possibility of establishing a cognitive ethology, in which important cognitive behaviors occurring in the natural environment could be subject to normative formulations as suggested by Weber, et a. (1974), seems particularly promising. When the mean for insights found in the present study (5.76) and the mean value found in the Weber study (5.38) are compared, they are remarkably similar. The standard deviations for insights are also very similar, 5.74 and 4.94, respectively.

In the Weber, et al. (1975) study, the mean for laughs was reported as 35.2, while in the present study the overall mean count was found to be 45.62. This difference could be attributable to what economists call "seasonal fluctuations", i.e., exam schedules, beginning or end of the academic semester, or other such factors. In all these studies, the values represent count data obtained by Ss self-monitoring for a twenty-four hour interval.

It was predicted that Ss would rate the type of counting devices used in self data collection differentially for convenience. Specifically, it was found that Ss rated the mechanical wrist counters as significantly more convenient than either the mechanical pocket counters or the 3" X 5" cards. It was hypothesized that convenience of the counter might significantly effect the obtained count, particularly of laughs, because of their assumed greater frequency. Specifically, it was felt that the more convenient counter would net higher laugh counts because Ss would be able to keep more accurate real-time counts of laughs, which occur at a relative high frequency, and hence the more convenient counter would be more suitable for the task. It was found that Ss using the two-channel pocket counters counted significantly more laughs than either Ss using the wrist counters or Ss using the 3" X 5" cards. This was not an expected result, as Ss had rated the wrist counters as significantly more convenient. It is possible that because laughs usually occur in a social setting and wrist counters are more obtrusive, that Ss may have felt inhibited while counting in the social situation. The results do suggest that portable counting instruments can seriously affect the reported frequency of self-monitored data, particularly in the case of behaviors occurring at relatively high frequencies, and subject to continuous real-time counting. No counter effects were found in the counts of insights, presumably because insights occur at such a low frequency that convenience does not significantly effect accurate recording.

Sex of S also proved to be a significant factor in the obtained counts of both laughs and insights. Male Ss counted significantly more insights than female Ss, and significantly fewer laughs than did the females. This finding suggests as previously mentioned (Mahoney and Thoresen, 1974; Jeffreys, 1974) that the sex of the individual may effect results of self-monitoring studies. More specifically, it suggests that sex of S and the behavior to be monitored be taken into consideration.

An attempt was made to assess the amount of fabricated data for the counts of laughs and insights, by administering an anonymous fudging questionnaire adapted from the Weber, et al. (1974) study. Sixty percent of the Ss report no fudging for either laugh or insight counts, thirty-one percent and thirty percent of the Ss report that they fudged from one to ten percent of the count data for laughs and insights, respectively. The differential amounts of fudging for the treatment conditions, (counters X behavior), was analyzed for purposes of looking at the possibility that fudging of laughs particularly may have been associated more with the less convenient counters. Although there was a slight trend in this direction, it was found to be non-significant.

Although there is no absolute guarantee that Ss did not fake their count data, a theoretical rationale has been suggested by Weber, et al. (1974) which predicts that the distributions of estimates and the fabricated data distributions should have similar forms and variabilities. If this is a reasonable assumption, then it appears that a significant proportion of the Ss in the present study did make an effort to collect real data.

A final analysis was performed looking at the percentage of Ss reporting surprise or no surprise at either their counts for laughs or insights. Ss indicated that they were significantly more surprised by the frequency with which they laughed than by the number of insights they counted. It is possible that Ss feel more confident, express less surprise, about their knowledge of insights for the same reason Ss tend to over-estimate these behaviors, namely, insights may be more desirable in an academic setting and self-knowledge of insights may be seen as more important in a psychological experiment.

One possible explanation for the present differences in the estimated frequencies between the two behaviors, laughs and insights, is the availability of examples of the two behaviors. Recently, Tversky and Kahneman (1973) reported a bias in estimating the frequency and probability of certain events with higher frequency estimates being associated with the ability to think of relevant instances. Since laughs were significantly estimated to occur at significantly higher frequencies than insights, it is possible that such an availability bias was operating, in that Ss could easily bring to mind more instances of laughing than they could of insights.

CHAPTER V

SUMMARY

The purpose of this study was to investigate the extent of self-knowledge of two classes of behavior, private subjective (insights) and public objective (laughs), and to look at the relative contributions of three types of portable counters and sex on self-monitored frequencies of laughs and insights. Ninety-six Ss were randomly assigned to three counter conditions: wrist-counter, pocket-counter, and 3" X 5" card, and to two groups, estimate and no estimate. Forty-eight Ss in the estimate group were required to estimate the frequencies of the two behaviors and then to count their occurrence for a twenty-four hour period; the Ss in the no estimate condition were simply to count the behaviors for the same length of time. All Ss took a post-experiment questionnaire which included reactions to their counts and the requirement that they indicate anonymously the amount of data faked.

Correlations obtained from forty-eight subjects in the estimate conditions indicated a significant relationship between estimated frequencies of both laughs and insights and counted frequencies of both behaviors, thus supporting a partial self-knowledge hypothesis.

Ss rated wrist-counters significantly more convenient than the pocket-counters or the 3" X 5" card, however, significantly more laughs were counted by S using the pocket-counter. The over-all results suggest that counting/recording instruments do interact with certain behaviors.

which are being self-monitored.

It was also found that males tend to count more insights and fewer laughs than do females, suggesting that sex of Ss may significantly effect the results of self-monitoring studies, particularly in respect to the behavior being monitored.

Finally, Ss reported more surprise at their laugh counts and less surprise at their counts of insight.

In conclusion, the procedure for assessing self-knowledge used in this study may lend itself to a more direct way of assessing the reliability and validity of private subjective behaviors and also to the establishment of normative information on cognitive behaviors occurring in the natural environment. As a part of assessing the reliability of self-monitored data, it was found that portable counting devices can interact with the behavior being monitored.

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APPENDIX A

POST-EXPERIMENT AND FUDGING QUESTIONNAIRE

Age________________________ Counter or card number____________________

Number of insights counted__________ Number of laughs counted ________

Sex: M, F; Type of counting device: Wrist Pocket Card

Please answer <u>all</u> questions.

1. Where did you carry the counter (i.e. pocket, purse, etc.)?__________

____

2. About how many minutes (excluding sleeping time, baths, etc.) did you <u>not</u> have the counter with you? ______________________________________

3. How convenient was the counting device? (Indicate by circling one of the following.)

1	2	3	4	5
very convenient				not very convenient

4. Did the actual counting/recording of either insights or laughs interfere with the behavior (did you count more or less than you expected)?

____

5. Did anyone notice you counting, if so what was the nature of their reaction (i.e., laughed, seemed interested, etc.)? ____________________

____

6. What was your basic activity during the day (i.e., studying, partying, relaxing, etc.)? ____

7. Was it a typical or atypical day for you? _________________________

8. Were you surprised at the number of times you laugh in a day?

Yes______ No ______ If yes, was the count lower or higher than you expected? ____

9. Were you surprised at the number of insights you had? Yes ______ No ______ If yes, was the count lower or higher than you had expected?

____

10. What did you think of the counting procedure (i.e., was it dumb, interesting, boring, etc.)? ____

11. In your opinion, what was the purpose of the experiment? __________

____

____

Age__________________________ Counter or card number____________________

Number of insights counted___________ Number of laughs counted__________

Sex: M, F; Type of counting device: Wrist Pocket Card

To evaluate the effectiveness of self-monitoring procedures, we are asking that you indicate the amount of data you fudged for both the counts of insights and laughs. "Fudging" does not include times when you may have briefly forgotten to count and shortly thereafter made an intelligent estimate. Fudging does include fabricated data which has no relationship to what was actually happening.

Place an X in the appropriate place.

Amount Fudged	Insights	Laughs
0%		
1-10%		
11-30%		
31-50%		
51-99%		
100%; I made it all up		

APPENDIX B

INSTRUCTIONS TO SUBJECTS

In this experiment you will be required to observe carefully two of your own behaviors for the next twenty-four hours. You have been provided with counters and cards with which to record the occurrence of these behaviors for the twenty-four hour observation period. (Use of the counters and cards was then demonstrated.)

The two behaviors which you will be observing and counting are Laughs and Insights, and are defined on the sheets I have given you. (The definitions were read and examples of each behavior given, then Ss were asked if they had any questions concerning the definitions. If questions were asked, further examples were given until all Ss understood.)

Your task specifically will be to self-observe and to count both behaviors immediately after they have occurred. This will require that you have your counters or cards close at hand, so that you may record the occurrence of either behavior as soon as it has happened. The counting task does not require that you disrupt your normal activities for the following twenty-four hours. It simply requires that you keep the counters and cards with you and count the number of times you laugh and the number of insights you have. Since this is a new area of research, accurate data is very important for this study and future studies, and I would like you to be as conscientious as possible in recording your behaviors.

At this point, Ss in the estimate condition were handed a prepared sheet for making numerical estimates of the two behaviors and the following instructions given. On this sheet I would like you to simply estimate or make your best guess as to how often you laugh in a twenty-four hour period and how many insights you have for this same period. Please make a single numerical estimate rather than a range of numbers. After this was done, the sheets were collected.

Then all Ss were told: I would like for you to begin counting your behaviors as soon as you leave the conference room and to continue counting until tomorrow at this same time, when I will meet with you here and collect your counters and cards. I would also like to give you a short questionnaire at that time and tomorrow I will also record your extra credit. (Subjects were then told to keep their definition sheets and then were dismissed.)

APPENDIX C

BEHAVIOR DEFINITIONS

1. Laugh: Any humor-related production of sound (audible) that a person may emit, ranging from a short "little" chuckle to a long "big" belly laugh. For example, one may see something funny, hear something funny, or think something funny. As long as the laugh is external (audible), then you may count it. If the laugh is in response to an extremely funny joke and laughter continues for a long time only count this as 1 (one) laugh.

2. Insight: This is defined as "suddenly getting a distinctive, clear idea, or suddenly seeing the solution to a problem. Sometimes people describe it as an "aha" experience, and the comic strips show it as a light bulb coming on in the head." For example: you may be sitting at your desk or anywhere and suddenly the answer to a problem that you had been working on comes to you. You may suddenly realize that a friend was not really angry at what you did, but rather he was frustrated because he had made a low grade on his history test.

APPENDIX D

PERCENT OF COUNT DATA FABRICATION AS A RESULT

OF COUNTER AND BEHAVIOR

Counter	Behavior	Amount Fudged (Percent of Data)					
		None	1-10	11-30	31-50	51-99	All
Wrist (n=32)	Laughs	66.0	34.0	0	0	0	0
	Insights	66.0	28.0	6.0	0	0	0
Pocket (n=32)	Laughs	76.0	20.0	0	4.0	0	0
	Insights	66.0	28.0	3.0	0	3.0	0
Card (n=32)	Laughs	56.0	41.0	3.0	0	0	0
	Insights	66.0	34.0	0	0	0	0

APPENDIX E

AOV OF AMOUNT OF FABRICATION: TYPE OF COUNTER AND BEHAVIOR

Source	df	MS	F
Total	192		
Between Subjects	95		
Counter	2	0	0
Error Between	93	.731	
Within Subjects	97		
Behavior	1	0	0
Behavior X Counter	2	0	0
Error Within	94	.148	

APPENDIX F

MEAN COUNTS FOR COUNTER, SEX, AND BEHAVIOR

Counter	Insights		Laughs	
	Male	Female	Male	Female
Wrist (n=16)	8.06	4.81	32.68	50.75
Pocket (n=16)	6.06	5.06	49.93	76.62
Card (n=16)	7.93	2.62	28.00	35.75
Pooled Over Counters	7.35	4.16	36.87	54.37
Pooled Over Counters and Sex	5.76		45.62	

VITA

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Master of Science

Thesis: LAUGHS AND INSIGHTS: SELF-KNOWLEDGE AND THE EFFECTS OF PORTABLE COUNTING INSTRUMENTS ON FREQUENCY OF SELF-MONITORED PUBLIC AND PRIVATE BEHAVIORS

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